

REMARKS

The Office Action dated April 20, 2007 has been received and carefully studied.

A Request for Continued Examination is filed herewith.

The Examiner rejects claims 1-8 (sic, 1 and 3-8) under 35 U.S.C. §103(a) as being unpatentable over Koyama et al., U.S. Publ. No. 2005/0271922 in view of Kubota et al. The Examiner states that Koyama et al. disclose the preparation of aromatic polymer electrolytes bearing side chains adhering to the formula $(CH_2)_n-SO_3H$ wherein n is 1 to 6, and that any known sulfoalkylation method may be used. Kubota is cited for its disclosure of a synthetic approach for introducing sulfonic acid groups that mirrors the approach being claimed.

By the accompanying amendment, claim 1 has been amended by restricting the leaving group X to a halogen atom. Support for the amendment can be found on page 11, third and fourth lines from the bottom. Claim 3 has been amended accordingly.

Submitted herewith is a second Declaration from Mr. Masahiro Hamada, one of the inventors of the present invention. In the second Hamada Declaration, further experiments were carried out for sulfonation of chloromethylated polyether sulfone to sulfomethylated

polyether sulfone by the reaction (1) and (2) disclosed in column 7, lines 1-8 of Kubota et al. The reaction (4) disclosed in column 7, lines 12-15 of Kubota et al. was not carried out because this method used a thiol group as a leaving group and is no longer within the scope of the instant claims.

Furthermore, an experiment for sulfonation ("the dimethyl sulfide method" in the Hamada Declaration) of chloromethylated polymer with sodium sulfite and dimethyl sulfide, which is disclosed in Makromol. Chem., Rapid Commun. 1, 297-302 (1980), Frank Doscher et al. (see page 300, lines 10 to 1 from the bottom) and is described at page 2, lines 1-22 of the present specification, was carried out.

The products obtained from Experiments (1) and (2) and from the Doscher et al. method could not be identified by NMR and an ion-exchange capacity of the product from Experiment (1) could not be determined. The ion exchange capacity of the product from Experiment (2) was very low, and the product from the Doscher et al. method barely had any ion exchange capacity.

Further, Comparative Example 2 of the present specification shows that preparation of sulfomethylated polyether sulfone by sulfonation of chloromethylated polyether sulfone with sodium sulfite resulted in failure.

In this regard, sulfonation reaction of a halogeno alkyl group with sodium sulfite is well known as a sulfonation method (see the attached document: J.Am.Chem.Soc., 81, 2997 (1959)).

These facts show clearly that typical sulfonation methods of halomethylated polymer to sulfomethylated polymer known prior to the present invention give few or no sulfomethylated polyether sulfones having ion-exchange ability from halomethylated polyether sulfone. Thus, the skilled artisan cannot simply use any sulfoalkylation method to prepare sulfoalkyl-containing polymers with a reasonable expectation of success. In contrast, the present method successfully provides sulfomethylated polyether sulfone with ion-exchange ability despite the high crosslinking reactivity of chloromethylated polyether sulfone.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,


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